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DEPARTMENT OF NATURAL RESOURCES  
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June 16, 1993

To: Minerals File

From: Holland Shepherd, Senior Reclamation Specialist *HS*

Subject: Inspection Barney's Canyon, Kennecott Corp., M/035/009, Salt Lake County, Utah

Meeting Date: June 16, 1993  
Meeting Time: 9:00 a.m. - 1:30 p.m.  
Conditions: Sunny, warm and windy  
Participants: Dave Hodson, Bill Dodge, Barneys Canyon, Kennecott;  
Holland Shepherd, DOGM

Purpose of Inspection: Review sites where reclamation has been conducted on the site. Look at areas which were recently approved for mine expansion. Discuss waste rock research at the site.

## Office Discussion

I first met with Dave Hodson and Bill Dodge at the mine office prior to the going out on site. We discussed the meeting with Division of Water Quality last week when we talked about the waste rock sulfide issue at the site. We also talked about Mr. David Morrey, of SRK Consultants (SRK), research on revegetating waste rock dumps at the site. A test plot has already been established on the site at an area called the football field in Barney's pit. We also discussed applying column leach tests and the HELP model to the waste rock water quality question. I brought in some information on both for Mike Pagel.

Mr. Hodson indicated that they had hoped to start using sewage sludge at the site but they had some problems getting testing data back from the Central Valley Sewage Treatment facility. Mr. Hodson said that the mine would like to start using sewage and yard wastes mulch from the Salt Lake County landfill. He indicated that David Morrey of SRK had pointed out that some of the yard wastes might be



detrimental to plant growth. I assume this would have to do with pine needles. We spoke of quality control at the landfill.

We also discussed the hydro-mulch type application of sewage sludge and yard wastes. I indicated that Bingham Canyon was thinking about taking this approach on their waste dumps.

We discussed the completion of the revegetation standard for the angle of repose waste dumps. We had agreed during the permitting that the standard would not be completely exempt, but that a reduced standard would be developed for these sites based on field information to be collected by JBR Consulting. Apparently, the sites that were to be used to develop this site specific standard were redisturbed by mining. Mr. Hodson and I discussed establishing a 50% standard. He indicated that he felt that this would be a fair standard to set, based on the results he had seen thus far on steep angled hillsides, at the mine site. I mentioned another alternative, to gain a more accurate idea, would be to wait 2 to 3 years and base a standard on the work that SRK was doing on the site.

I later spoke with Bill Dodge individually about the new mine expansion; Stage D, which would mostly involve the Melco Pit. The Pit would be greatly expanded and a new very large area for mine wastes would be constructed northwest of the present Melco pit. The revision would also involve the construction of a new haulage road from the pit to the connect by the SBCS pit. The operator would be constructing the road through virgin ground. One benefit would be the potential backfilling of the SBCS pit. Negatives would involve the impact to virgin ground. Utilizing the existing haulage road would not be practical or economically feasible because of the increased haulage distance, the steeper climb and the extra overburden material which would have to be removed to allow access from the north to the south sides of the pit.

Mr. Dodge explained various scenarios for the construction of the north haulage road down along Barneys Canyon. The ephemeral stream channel and hillsides would be affected differently depending on the scenario. The hillsides in this area are extremely steep, close to the angle of repose.

### **Field Inspection**

Our first stop was at the clay barrow area located in Bancroft Wash. The area was reclaimed about 2 years ago. A small impoundment was left at the bottom of the reclaimed area. The pond was holding water and supporting a new crop of cattails planted by the operator. Most of the area has been successfully revegetated, except a couple spots were gulling and settling has created erosion and lack of plant growth. These areas should be filled in and replanted. Also, Mr. Dodge mentioned rechanneling the drainage, such that it does not concentrate on the slope.

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Kennecott Waste Rock

June 16, 1993

We visited the BC-3 Clay barrow area. The site was listed in the annual report as being reclaimed; however, the site is still active and only under interim reclamation or more precisely interim stabilization. The area has been hydro-seeded to stabilize barren areas only, and has not been regraded and retopsoiled yet. The stabilization effort has not been too successful. Bill Dodge will check with Steve Lackey concerning what actually was done to the site. (see attachment)

The operator is working on improving the road culvert system. Existing culverts are being unclogged. Sediment traps are being added to the culverts to drop out large chunks. Also, the operator is adding synthetic sleeves to the discharge end of the culvert to prevent hillside erosion. The material being used is called Poly-Pro and costs about 25 cents a foot.

We looked at some of the new development at the site associated with the Melco pit, the SBCS pit, the 7300 dump, the SBCS waste dump and the Melco dump. This new activity is related to the operator's recently approved amendment to expand the mine plan.

The new SBCS waste dump is to be reconfigured based on the finding that sulfates make up a portion of the waste rock material. The waste rock was going to be dumped in a fashion which would block the stream channel and cause impounding of water behind the structure. Mr. Dodge indicated that Kennecott would amend the existing plan to show the change.

We stopped briefly at the Football Field test plots, which are being installed by SRK Consulting. The plots are being developed to determine which reclamation applications will work the best on steep slope, waste rock reclamation. The operator will be comparing different soil amending techniques with topsoiled and non-topsoiled wastes. (see attachment)

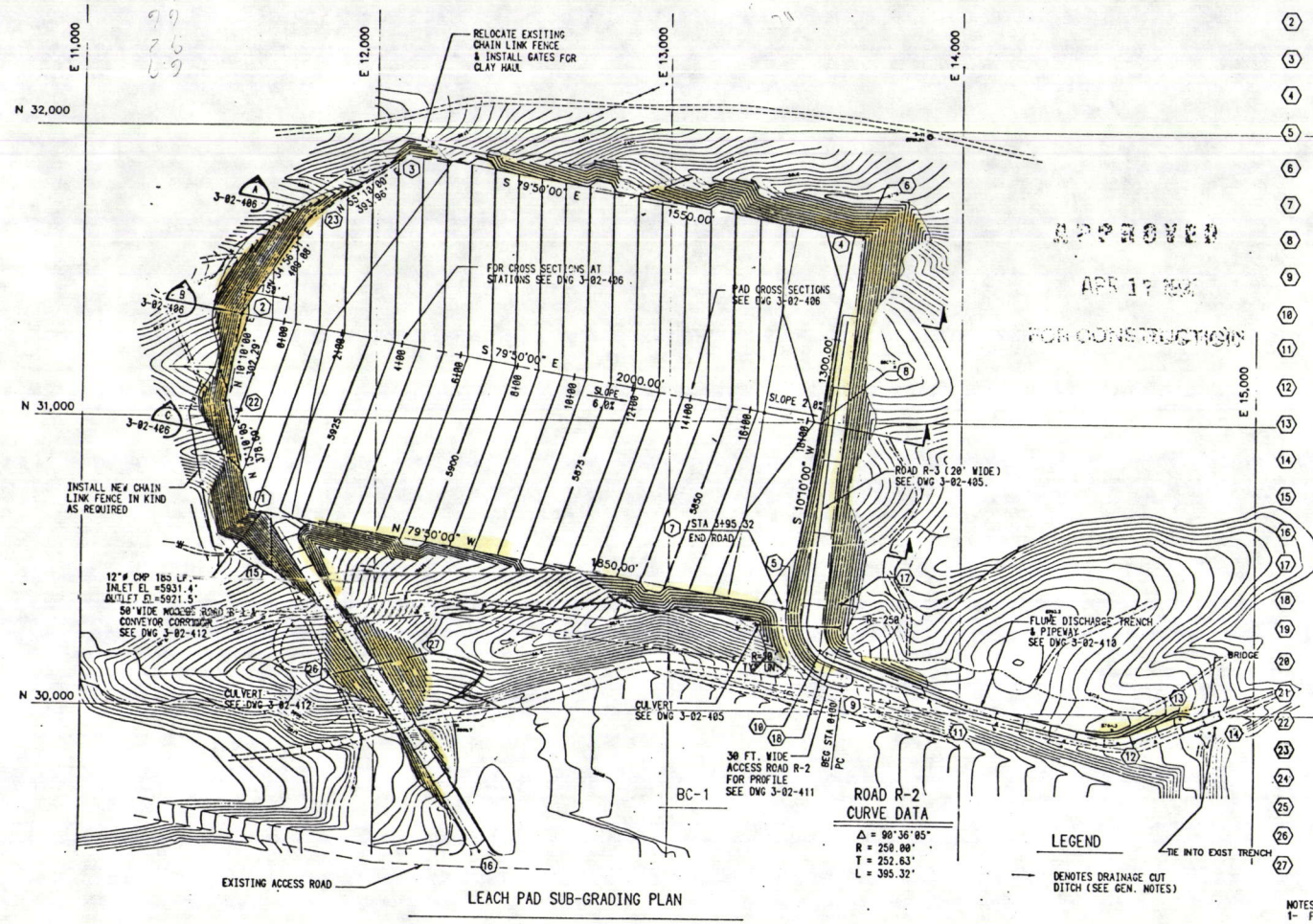
## Summary

Mr. Dodge and I discussed the need to finish the review of the consolidated Barney's Canyon Mining and Reclamation Plan, which is in draft form right now. The plan does not require approval because it is the consolidation of the original mine plan and the 1992 amendment, both of which have already been approved. The consolidated plan will be used as a base document from which to develop the next amendment, so the consolidated plan needs to be completed before the new amendment is to be submitted.

Mr. Dodge indicated that the new plan would be ready to be sent in for review by DOGM, by the middle or end of July 1993.

jb  
Kenbar





APPROVED  
APR 17 2007  
FOR CONSTRUCTION

POINT	COORDINATES	ELEV	DESCRIPTION
1	N 30683.8112 E 11576.1927	5936.00	CORNER OF PAD
2	N 31358.8520 E 11543.2878	5951.50	CORNER OF PAD
3	N 31918.4456 E 12188.9450	5918.00	CORNER OF PAD
4	N 31636.8518 E 13626.8116	5833.00	CORNER OF PAD
5	N 30357.2638 E 13397.1459	5833.00	CORNER OF PAD
6	N 31631.3635 E 13657.2163	5833.00	WP COLLECTION TRENCH & T/SUBGRADE
7	N 30359.9115 E 13352.3814	5833.30	WP ACCESS ROAD & T/SUBGRADE
8	N 30997.8578 E 13511.8787	5830.50	WP PAD
9	N 30876.3942 E 13596.6928	5826.00	WP ACCESS ROAD & T/SUBGRADE
10	N 30214.1732 E 13515.1349	5825.00	WP DISCHARGE TRENCH & PIPEWAY
11	N 30824.8256 E 14823.8934	5792.00	PI DISCHARGE TRENCH & PIPEWAY FL
12	N 29983.9127 E 14539.8222	5764.5	PI DISCHARGE TRENCH & PIPEWAY FL
13	N 29989.8414 E 14748.4899	5754.00	PI DISCHARGE TRENCH & PIPEWAY FL
14	N 29968.9131 E 14868.2794	5750.00	PI DISCHARGE TRENCH & PIPEWAY WORK LINE
15	N 30678.5728 E 11658.0161	5931.50	CP ACCESS ROAD R-1 & CONVEYOR CORRIDOR
16	N 29513.3662 E 12361.8995	5915.00	CP ACCESS ROAD R-1 & CONVEYOR CORRIDOR
17	N 36375.40 E 13592.30		EXISTING SPRING
18	N 30294.4469 E 13541.2612	5803.00	PI DISCHARGE TRENCH & PIPEWAY FL
19	N 30246.6732 E 13512.3631	5808.83	WP T/C FLUME CHAMBER
20	N 30227.7688 E 13518.4678	5808.83	WP T/C FLUME CHAMBER
21	N 29973.2873 E 14815.5422	5756.00	WP BRIDGE & DISCH. TRENCH
22	N 31852.5431 E 11489.9248	5948.21	CORNER OF PAD
23	N 31685.4194 E 11777.5803	5937.46	CORNER OF PAD
24	N 30382.7692 E 13285.6381	5805.00	24\"/>
25	N 30294.2621 E 13546.5874	5808.00	24\"/>
26	N 30188.7647 E 11849.3287	5896.00	16\"/>
27	N 30188.6227 E 12178.6785	5878.00	16\"/>

NOTES:  
1- FOR GENERAL NOTES SEE DWG 3-02-403.

ROAD R-2  
CURVE DATA  
 $\Delta = 90^\circ 36' 05''$   
 $R = 259.00'$   
 $T = 252.63'$   
 $L = 395.32'$

LEGEND  
--- DENOTES DRAINAGE CUT  
DITCH (SEE GEN. NOTES)

REFERENCE	DWG. NO.	DESCRIPTION
	3-02-429	OVERALL SITE PLAN
	3-02-427	FINISH GRADING PLAN, GENERAL NOTES
	3-02-485	SOLUTION COLLECTION PLAN
	3-02-418	DISCHARGE TRENCH PLAN & PROFILE
	3-02-417	ACCESS ROAD PLAN & PROFILE

REFERENCE	DWG. NO.	DESCRIPTION	NO.	DATE	REVISIONS	ZONE	BY	CHK.	AP'D.	NO.	DATE	REVISIONS	ZONE	BY	CHK.	AP'D.
	3-02-406	PAD CROSS SECTIONS														

Ford, Bacon & Davis Utah, Inc.  
ENGINEERS - CONSTRUCTORS  
475 CHIPETA WAY SALT LAKE CITY, UTAH

APPROVED BY	BY	DATE	DESIGN	BY	DATE
APPROVED BY			DRAWN	JP	1-15-98
APPROVED BY			CHKD.		
APPROVED BY			CHKD.		

BARNEYS CANYON MINE  
LEACH PAD BC-3  
SITE SUB-GRADING PLAN

KENNECOTT  
BARNEYS CANYON MINE  
ENGINEERING DEPARTMENT  
SALT LAKE CITY, UTAH

SCALE: 1"=200'

DRAWING NO. 133C003C  
3-02-401

REV. 1  
LAST  
MINE



#### 4.1 Fertilizer specifications

The NOI 89 and 92 specifications are derived from the recommendations contained in the Barney's Canyon Reclamation Plans, NOI 89 and as amended in NOI 92. The SRK formulation has been calculated according to results of chemical analysis of soil and waste rock. Specifically, the formulations include:

##### NOI 89

- green alfalfa mulch at 4000 lb/acre; and
- compound 18-46-0 at 310 lb/acre.

##### NOI 92

- green alfalfa mulch at 2000 lb/acre; and
- urea at 45 lb/acre.

##### SRK 92

- alfalfa, straw or wood fibre mulch at 2000 lb/acre;
- ammonium nitrate at 135 lb/acre; and
- triple superphosphate at 180 lb/acre.

##### Control

- no mulch or fertilizer application.

#### 4.2 Species Selection

Due cognizance was taken of the species recommended for vegetation establishment on topsoiled and non-topsoiled areas, in the NOI 89 and NOI 92 reclamation plans. Whilst in general agreement with these specifications, SRK proposes a modified mixture to fulfill the following requirements:

- rapid establishment of a temporary "nurse" crop of one grass and one legume species;
- establishment of a more diverse cover of native and naturalized grass and forb species; and
- the development of a root architecture and surface cover to fulfill the design criteria for optimally erosion resistant cover (refer to Appendix B ).

The proposed species mixture contains annual and perennial species of grasses and forbs which are variously sod-forming, bunch-forming, laterally-spreading or deep rooting. The varieties of each species have been selected for tolerance of the relatively stressful environmental conditions which prevail at the mine. A full description of the species and their application rates is shown in Table 3, with their adaptations described in Table 4. Derivation of seed application rates is explained in Appendix C.

**TABLE 3**  
**SPECIES OF GRASSES AND FORBS SELECTED FOR RECLAMATION TRIALS**  
**AT BARNEY'S CANYON MINE**

Botanical Name	Variety	Common Name	Growth Habit	Application Rate lb/acre
<i>Agropyron smithii</i>	Boston/ Rosanna	Western wheatgrass	Perennial/ sod forming	5
<i>Agropyron spicatum</i>	Secar	Bluebunch wheatgrass	Perennial/ bunch	4
<i>Festuca ovina</i>	Covar	Sheeps fescue	Perennial/ bunch	2
<i>Elymus elymoides</i>		Squirrel tail	Perennial/ bunch	2.5
<i>Poa canbyi</i>	Canbar	Canby bluegrass	Perennial/ bunch	1
<i>Secale cereale*</i>		Cereal rye	Annual/ nurse	4
<i>Astragalus cicer</i>	Lutana	Cicer milkvetch	Perennial/ rhizomes	3
<i>Melilotus officinalis*</i>	Yukon	Yellow sweet clover	Short-lived biennial	1
<i>Medicago sativa</i>	Vernal	Alfalfa	Perennial/ deep-rooted	2
<i>Penstemon palmeri</i>	Cedar	Palmer penstemon	Perennial/ sod forming	1

\* Temporary "nurse" cover.

All application rates have been calculated for drill seeding. Any broadcast method of seeding, including hydraulic placement, will require double the prescribed rates.

